

Enhanced Source Removal Demonstration

A collaborative effort between the US Air Force Research Laboratory (AFRL/MLQ) and the US EPA National Risk Management Research Laboratory (NRMRL) to Remediate bulk chlorinated solvent contamination

THE NEED

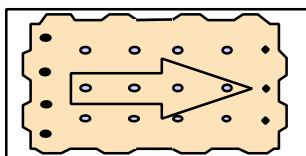
Present methods of groundwater contaminant plume control and remediation typically involve pump-and-treat (P&T) which is costly and often not completely effective. Currently, there is no technology specifically aimed at removing or treating the bulk solvent material that sinks to the bottom of aquifers or is trapped as "ganglia" in the soil interstices. Efforts to enhance removal rates by groundwater extraction provide effective contaminant plume control, but may still take decades to remove the contaminant source.

THE OBJECTIVES

The objective of this research is to demonstrate processes enhancing contaminant removal in a variety of geologic settings. This effort will produce guidance documents for applying these processes to remediate contaminated groundwater. They will address the entire remediation effort including site characterization required to achieve the maximum benefit from the remediation technologies included in the study.

THE TECHNOLOGIES

This effort involves two series of field demonstrations of enhanced P&T technologies supported by site characterization and laboratory research. These technologies include co-solvent flushing (three technologies), surfactant injection (two technologies), venting/air sparging, groundwater circulation wells, and steam-enhanced extraction. The work focuses on remediation of sites believed to be contaminated by non-aqueous-phase liquids (NAPLs), such as chlorinated solvents.



TYPICAL TEST CELL

- Multilevel Sampler
- Injection Well
- ◆ Extraction Well

PROGRAM FOCUS

- 3m x 5m Test Cells
- Two Demonstrations
 - LNAPL site
 - Hill AFB, UT
 - DNAPL site
 - Dover AFB, DE

DEMONSTRATION SCHEMATIC

Program]. The performances of the technologies will be compared with each other as well as with P&T. The results of these comparisons will show the differential improvement achieved by one process relative to another.

THE TEAM

Both the AFRL/MLQ and the US EPA NRMRL are performing this SERDP-funded project. NRMRL was responsible for most of the field testing at Hill AFB, while AFRL/MLQ was responsible for characterizing the site, constructing the test cells, and testing the steam enhanced extraction technology. At the DNTS, AFRL/MLQ will be responsible for demonstrating two flushing technologies: co-solvent flushing and single-phase microemulsion flushing.

TECHNOLOGIES & PARTICIPATING LABS

- Single-Phase Microemulsions: Univ. of FL
- Complexing Sugar Flush: Univ. of AZ
- Surfactant Solubilization: Univ. of OK
- Surfactant Middle-Phase Microemulsion: Univ. of OK
- Co-solvent Solubilization: Univ. of FL
- Co-solvent Mobilization: Clemson Univ.
- In-well Aeration/Vert Co-solvent Solubilization: Univ. of AZ
- Steam Injection: PRAXIS Environmental Technologies
- Air Sparging/Soil Vapor Extraction: MI Tech.Univ.

STATUS

Field demonstrations at Hill AFB were completed in November 1996. Two cells were built at the DNTS; demonstrations began in the summer of 1998. Final reports to Hill AFB on the first round of technology demonstrations are being published. Efforts are under way to locate a suitable DNAPL site for field testing the technologies at an "uncontrolled" site in 1998.

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The first set of demonstrations was held at Hill Air Force Base (AFB), UT, Operable Unit 1 and was completed in FY97. A second set of demonstrations will begin in FY98 at the Dover AFB, DE, Dover National Test Site (DNTS) [sponsored by the Strategic Environmental Research and Development Program (SERDP) and the National Environmental Technology Test Sites